

Remarks

Claims 1, 4-11 and 14-20 stand rejected and remain pending. No claims are amended herein. The Assignee respectfully requests reconsideration of the rejections and requests allowance of claims 1, 4-11 and 14-20.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 4, 11 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,344,922 to Grubb et al. (hereinafter "Grubb") in view of C.R.S. Fludger, V. Handerek and R.J. Mears, "Pump to signal RIN transfer in Raman fibre amplifiers," *Electronics Letters*, vol. 37, no. 1, pp. 15-17 (January 4, 2001) (hereinafter "Fludger"). (Page 2 of the final Office action.) Also, claims 5, 6, 8, 15, 16 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grubb in view of Fludger and U.S. Patent No. 6,603,593 to Fidric et al. (Page 4 of the final Office action.) Claims 7, 9, 10, 17, 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grubb in view of Fludger and "Fiber-Optic Communication Systems" by Agrawal. (Page 4 of the final Office action.) The Assignee respectfully traverses the rejections in view of the following discussion.

The Office action states, "Grubb does not specifically disclose an unequal power distribution between the forward and counter propagating pumps. Fludger teaches the effects of pump propagation direction on RIN transfer (entire article). It would have been obvious to one of ordinary skill (e.g., an optical engineer) in the art at the time the invention was made to unequally distribute the power of the forward and backward propagating signal for the advantage of minimizing RIN transfer." (Page 3 of the final Office action.) In response, the Assignee respectfully traverses the rejections, as Fludger does not teach or suggest unequal forward and backward pumping, and no motivation exists to combine Grubb and Fludger.

Fludger provides "[a]n analytical model and measurements of the pump to signal relative intensity noise [RIN] transfer characteristics of co- and counter-pumped Raman amplifiers...." (Abstract.) More specifically, Fludger provides theoretical equations for determining RIN in a co-pumped (i.e., forward pumped) amplifier (equation (2)), and a counter-pumped (i.e., backward pumped) amplifier (equation (3)). The veracity of these

equations is then exhibited by way of experiment. (Right-hand column of page 16.) On the basis of these equations, Fludger determines that "the counter-pumped configuration is significantly more tolerant of pump noise than the co-pumped configuration."

However, at no point does Fludger discuss the effect on RIN if both forward and reverse pumping are performed simultaneously. Thus, Fludger does not teach or suggest the possibility of forward and backward pumping simultaneously, much less *unequal* forward and backward pumping. Additionally, whether the equations presented by Fludger are applicable to systems involving simultaneous forward and reverse pumping is an open question. Some interaction between forward and reverse pumping with respect to RIN may indeed occur, and the resulting effect on RIN cannot be determined on the basis of Fludger. For example, while Fludger indicates that counter-pumping alone results in lower RIN than solely co-pumping, using more counter-pumping than co-pumping may not necessarily result in lower RIN, as such a result cannot necessarily be ascertained from the Fludger equations. In fact, forward and reverse-pumping simultaneously, regardless of the relative powers involved, may result in a higher RIN than pumping solely in either the forward or reverse directions.

Also, as mentioned above, Fludger concludes that, on the basis of the equations presented therein, if RIN is problematic, counter-pumping is favored over co-pumping. Such a determination is inherently incompatible with the system of Grubb, in which *both* forward-pumping and reverse-pumping are implemented simultaneously over a single length of fiber. Thus, Fludger in fact *teaches away* from combined forward- and reverse-pumping. Thus, no motivation exists to combine Grubb and Fludger, and such indication is respectfully requested.

Thus, on the basis of the foregoing, the Assignee respectfully asserts that independent claims 1 and 11 are allowable in view of any combination of Grubb and Fludger, and such indication is respectfully requested.

Also, claims 4-10 depend from independent claim 1, and claims 14-20 depend from independent claim 11, thus incorporating the provisions of their associated independent claims. Thus, the Assignee contends that claims 4-10 and 14-20 are allowable for at least the reasons provided above in support of claims 1 and 11, and such indication is respectfully requested.

Therefore, in light of the discussion presented above, the Assignee respectfully requests withdrawal of the rejections of claims 1, 4-11 and 14-20.

Conclusion

Based upon the above remarks, the Assignee submits that claims 1, 4-11 and 14-20 are allowable. Additional reasons in support of patentability exist, but such reasons are omitted in the interest of clarity and brevity. The Assignee thus respectfully requests allowance of claims 1, 4-11 and 14-20.

The Assignee believes no additional fees are due with respect to this filing. However, should the Office determine additional fees are necessary, the Office is hereby authorized to charge Deposit Account No. 21-0765 accordingly.

Respectfully submitted,

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